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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/724,713

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Yoshihiro Ikoma

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Washington, DC 20005-3096

EXAMINER
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CHUO, TONY SHENG HSIANG

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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03/03/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/724,713	<b>Applicant(s)</b> IKOMA, YOSHIHIRO	
	<b>Examiner</b> TONY CHUO	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 27 December 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 9-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 9-12 is/are rejected.
- 7) ☒ Claim(s) 1 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Claims 1-4 and 9-12 are currently pending. Claims 5-8 and 13-16 have been cancelled. The amended claims do overcome the previously stated 102 rejections of claim 1. However, upon further consideration, claims 1-4 and 9-12 are rejected under the following new 103 rejections. This action is made FINAL as necessitated by the amendment.

### ***Claim Objections***

2. Claim 1 is objected to because of the following informalities: the phrase "in the catalyst" in lines 9 and 10 should be changed to "in the catalyst layer". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buche et al (WO 03/058735) in view of Koschany et al (US 6451470).

The Buche reference discloses a PEM fuel cell comprising an anode, a cathode, and a solid electrolyte membrane between the anode and cathode, wherein the cathode comprises a gas diffusion substrate, and an electrocatalytic layer formed on the gas diffusion substrate, and wherein the electrocatalytic layer comprises a platinum supported carbon black, a proton-conducting polymer, and particulate graphite at a loading of 1-40wt%.

However, Buche et al does not expressly teach a second carbon particle in the catalyst layer that is in a range of 10wt% to 50wt% with respect to a weight of the entire catalyst layer. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Buche electrode to include a second carbon particle in the catalyst layer that is in a range of 10wt% to 50wt% with respect to a weight of the entire catalyst layer because product claims with numerical ranges which overlap prior art ranges were held to have been obvious (*In re Wertheim* 191 USPQ 90 (CCPA 1976)).

However, Buche et al does not expressly teach a gas diffusion layer that includes the first carbon particle and the second carbon particle. The Koschany reference discloses a gas diffusion layer comprising a carbon fiber material (first hydrophilic carbon material) that is filled with graphite (second hydrophobic carbon material) (See column 4, lines 16-32).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Buche electrode to include a gas diffusion layer that also includes the first hydrophilic carbon particle and the second hydrophobic

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carbon particle in order to maintain a high effective diffusion constant for reaction gases and a low effective diffusion constant for water so that water content is balanced in the electrode.

5. Claims 2-4 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buche et al (WO 03/058735) in view of Koschany et al (US 6451470) as applied to claims 1 and 9 above, and further in view of Terazono et al (US 2002/0009626).

However, Buche et al as modified by Koschany et al does not expressly teach an average value of lattice spacing of the [002] plane,  $L_c(002)$ , of the second carbon particle that is between 0.337nm and 0.348nm and a crystallite size in a direction of c-axis,  $L_c(002)$ , of the second carbon particle that is between 3nm and 18nm. The Terazono reference discloses a graphitized carbon support for a catalyst layer that has an average lattice spacing of  $d_{002}$  of 0.341 and a crystallite size  $L_c$  of 3.5 nm (See paragraph [0008],[0048]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize graphitized carbon particles having the above cited properties as the hydrophobic carbon black particles in the Buche/Koschany electrode in order to provide adequate water repellency which is controlled by the degree of graphitization of the carbon black particles (See paragraphs [0013],[0016],[0075]).

6. Claims 1 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto et al (JP 2000-243404) in view of Koschany et al (US 6451470).

The Yasumoto reference discloses a fuel cell comprising: an anode, a cathode, and a solid polymer electrolyte membrane placed between the anode and cathode, wherein both the anode and cathode comprise a gas diffusion layer; and a catalyst layer formed on the gas diffusion layer; wherein the catalyst layer comprises catalyst particles supported on a hydrophilic carbonaceous material, an ion conductive polymer, and a water repellent carbonaceous material; and wherein the content of the water carbon material in the catalyst layer is about 16 wt% with respect to a weight of the entire catalyst layer (See Abstract and paragraph [0024]).

However, Yasumoto et al does not expressly teach a gas diffusion layer that includes the first carbon particle and the second carbon particle. The Koschany reference discloses a gas diffusion layer comprising a carbon fiber material (first hydrophilic carbon material) that is filled with graphite (second hydrophobic carbon material) (See column 4, lines 16-32).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Yasumoto electrode to include a gas diffusion layer that also includes the first hydrophilic carbon particle and the second hydrophobic carbon particle in order to maintain a high effective diffusion constant for reaction gases and a low effective diffusion constant for water so that water content is balanced in the electrode.

7. Claims 2-4 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto et al (JP 2000-243404) view of Koschany et al (US 6451470) as applied to claims 1 and 9 above, and further in view of Terazono et al (US 2002/0009626).

However, Yasumoto et al as modified by Koschany et al does not expressly teach an average value of lattice spacing of the [002] plane,  $L_c(002)$ , of the second carbon particle that is between 0.337nm and 0.348nm and a crystallite size in a direction of c-axis,  $L_c(002)$ , of the second carbon particle that is between 3nm and 18nm. The Terazono reference discloses a graphitized carbon support for a catalyst layer that has an average lattice spacing of  $d_{002}$  of 0.341 and a crystallite size  $L_c$  of 3.5 nm (See paragraph [0008],[0048]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize graphitized carbon particles having the above cited properties as the water repellent carbon material in the Yasumoto electrode in order to provide adequate water repellency which is controlled by the degree of graphitization of the carbon black particles (See paragraphs [0013],[0016],[0075]).

### ***Response to Arguments***

8. Applicant's arguments with respect to claims 1-4 and 9-12 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TONY CHUO whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 7:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a



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TC

/Jonathan Crepeau/  
Primary Examiner, Art Unit 1795